


CLAIMS

What is claimed is:

1. An oscillator circuit, comprising: 
a plurality of ring oscillators,
wherein each ring oscillator produces an oscillatory output signal; and
wherein the ring oscillators are cross coupled such that each ring oscillator drives only one other ring oscillator.
2. The oscillator circuit of claim 1 wherein each ring oscillator comprises three stages.
3. The oscillator circuit of claim 2 wherein each stage comprises an inverter or a delay element.
4. The oscillator circuit of claim 1 wherein the oscillator circuit comprises four ring oscillators, each ring oscillator comprising three stages, and wherein the oscillator circuit produces a four phase clock comprising the oscillatory output signals from each of the four ring oscillators.
5. The oscillator circuit of claim 4 wherein the four oscillatory output signals vary in phase by 90 degrees.
6. The oscillator circuit of claim 1 wherein the plurality of ring oscillators comprise a first cell, a second cell, a third cell, a fourth cell, a fifth cell, a sixth cell, a seventh cell and an eighth cell, each cell having an input and an output and wherein the output of the first

cell connects to the inputs of the second seventh cells, the output of the second cell connects to the input of the third and fifth cells, the output of the third cell connects to the input of the fourth and first cells, the output of the fourth cell connects to the input of the fifth and eight cells, the output of the fifth cell connects to the input of the sixth cell, the output of the sixth cell connects to the input of the seventh cell, and the output of the seventh cell connects to the inputs of the eight and fifth cells.

7. The oscillator circuit of claim 1 wherein the plurality of ring oscillators implement differential signaling and the oscillator circuit further comprises a plurality of cells coupled to the ring oscillators and whose purpose is to reduce timing differences among at least some of the oscillator output signals.

8. A method, comprising:
providing a plurality of ring oscillators; and
cross-coupling the ring oscillators such that each ring oscillator drives one and only one other ring oscillator.

9. The method of claim 8 wherein providing the plurality of ring oscillators comprises providing a plurality of three-stage ring oscillators.

10. The method of claim 9 further comprising providing quadrature clocks.

11. The method of claim 8 wherein providing the plurality of ring oscillators comprises providing four, three-stage ring oscillators.